

10th Class 2018

Physics

Group-II

Paper-II

Time: 1.45 Hours

(Subjective Type)

Max. Marks: 48

(Part-I)

2. Write short answers to any FIVE (5) questions: 10

(i) How can you define the term wave?

Ans "A disturbance in medium which causes the particles of medium to undergo vibratory motion about their mean position in equal intervals of time is called wave."

(ii) What is meant by diffraction of wave?

Ans The bending or spreading of waves around the sharp edges or corners of obstacles or slits is called diffraction of wave.

(iii) Define pitch of sound. What is the relation between pitch and frequency of sound?

Ans The characteristic of sound by which we can distinguish between a shrill and a grave sound is called pitch of sound.

The relation between pitch and frequency of sound is that, pitch is depends upon the frequency. A higher pitch means a higher frequency and vice versa. The frequency of the voice of ladies and children is higher than that of men. Therefore, the voice of ladies and children is shrill and of high pitch.

- (iv) Calculate the frequency of a sound wave of speed 340 ms^{-1} and wavelength 50 m .

Ans Given data:

$$v = 340 \text{ ms}^{-1}$$

$$\lambda = 50 \text{ cm} = \frac{50}{100}$$

$$\lambda = 50 \times 10^{-2} \text{ m}$$

To find:

$$f = ?$$

Solution:

$$v = f \lambda$$

$$f = \frac{v}{\lambda}$$

By putting values, we get

$$= \frac{340}{50 \times 10^{-2}}$$

$$= \frac{340 \times 10^2}{50}$$

$$= \frac{340 \times 100^2}{50}$$

$$f = 680 \text{ Hz}$$

- (v) What is the audible frequency range for human ear?

Ans The range of frequency which human ear can hear is called audible frequency range.

A normal human ear can hear a sound whose frequency lies between 20 Hz and $20,000 \text{ Hz}$. This is audible frequency range.

- (vi) Define electric current and write its unit.

Ans The rate of flow of electric charge through any cross-sectional area is called current.

If the charge Q is passing through any area in time t , then current I flowing through it will be given by

$$\text{Current} = \frac{\text{Charge}}{\text{Time}}$$

$$I = \frac{Q}{t}$$

(vii) State Joule's law.

Ans The amount of heat generated in a resistance due to flow of charges is equal to product of square of current, resistance and time duration.

(viii) What is difference between musical sound and noise?

Ans Musical Sounds

"The sounds having pleasant effect on our ears are called musical sounds."

Examples:

Sounds of musical instruments such as flute, violin, drum, etc.

Noise

"The sounds which create jarring effect on our ears are called noise."

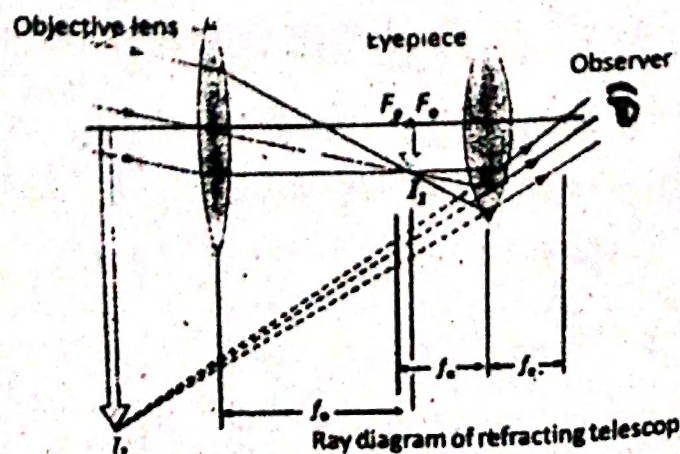
Examples:

Sound of traffic, sounds of machinery, etc.

3. Write short answers to any FIVE (5) questions: 10

(i) Draw the ray diagram of refracting telescope.

Ans



(ii) **How farsightedness defect can be corrected?**

Ans Farsightedness defect can be corrected with the aid of a suitable converging lens. The lens refracts the light rays and they converge to form an image on the retina. To an observer, these rays appear to come from near point to form a sharp virtual image on the retina.

(iii) **Define resolving power of an instrument.**

Ans The resolving power of an instrument is its ability to distinguish between two closely placed objects or point sources. In order to see objects, that are close together, we use an instrument of high resolving power. For example, we use high resolving power microscope to see tiny organisms and telescope to view distant stars.

(iv) **Define electric field intensity and write its unit.**

Ans "The strength of electric field at any point in space is known as electric field intensity."

Its formula is:

$$E = \frac{F}{q_0}$$

Unit: Its unit is NC^{-1} .

(v) **Define dielectric.**

Ans A capacitor consists of two thin metal plates, parallel to each other separated by a very small distance. The medium between two plates is air or a sheet of some insulator. This medium is known as dielectric.

(vi) **Define software.**

Ans The term software refers to computer programs and the manuals that support them. Computer programs are

machine-readable instructions that direct the circuitry within the hardware parts of the CBIS to produce useful information from data.

(vii) What is meant by optical fibre?

Ans An optical fibre is made by a highly transparent fine strand of glass or plastic coated or cladded with another type of glass whose refractive index is less than the inner tube.

(viii) Define "ICT" (in information technology).

Ans Information and communication technology (ICT) is defined as "the scientific methods and means to store, process and transmit vast amounts of information in seconds with the help of electronic equipments."

4. Write short answers to any Five (5) questions: 10

(i) Define Fleming's left hand rule.

Ans Fleming's left hand rule stated as:

Stretch the thumb, forefinger and the middle finger of the left hand mutually perpendicular to each other. If the forefinger points in the direction of the magnetic field, the middle finger in the direction of the current, then the thumb would indicate the direction of the force acting on the conductor.

(ii) State Lenz's law.

Ans Lenz's law states that:

"The direction of an induced current in a circuit always opposes the cause that produces it."

(iii) Write different names of component of cathode ray oscilloscope.

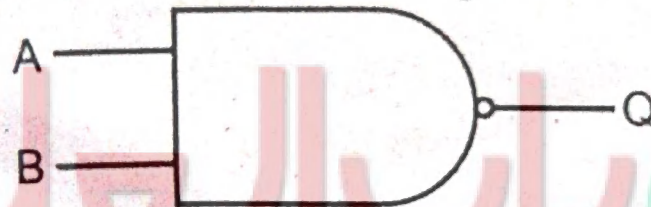
Ans The different parts of a cathode-ray oscilloscope are:

1. The Electron Gun.
2. The Deflecting Plates.
3. A Fluorescent Screen.

(iv) Draw diagram of NAND gate and write its truth table.

Ans Symbol:

The symbol of NAND gate is given below:



Truth table:

The truth table is given below:

A	B	$Q = \overline{AB}$
0	0	1
1	0	1
0	1	1
1	1	0

S_1	S_2	Q
OFF	OFF	ON
ON	OFF	ON
OFF	ON	ON
ON	ON	OFF

(v) Define digital electronics.

Ans The branch of electronics which processes the data being provided in the form of digits is known as digital electronics.

(vi) Define isotopes.

Ans "The atoms of an element which have same atomic number but different atomic mass number are isotopes."

(vii) Describe two uses of radio-isotopes.

Ans Radio-isotopes are used as:

1. Tracers:

In industry, tracers can be used to locate the wear and tear of the moving parts of the machinery. They can be used for the location of leaks in underground pipes.

2. Medical treatment:

Radio-isotopes are also used in nuclear medicines for curing various diseases.

(viii) Define nuclear fusion.

Ans "A process in which two light nuclei diffuse to form a heavier nucleus, with release of enormous amount of energy is called nuclear fusion reaction."

(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) Prove that motion of a mass attached to a spring is simple harmonic motion. (4)

Ans For Answer see Paper 2015 (Group-I), Q.5.(a).

(b) A concave lens has focal length of 15 cm. At what distance should the object from the lens be placed so that it forms an image at 10 cm from the lens? Also find the magnification of lens. (5)

Ans A concave lens always forms a virtual, erect image on the same side of the object. Given that,

$$q = -10 \text{ cm}$$

$$f = -15 \text{ cm}$$

$$p = ?$$

Using the lens formula:

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

$$\begin{aligned}
 \frac{1}{p} &= -\frac{1}{q} + \frac{1}{f} \\
 &= -\frac{1}{(-10 \text{ cm})} + \frac{1}{(-15 \text{ cm})} \\
 &= \frac{1}{10 \text{ cm}} - \frac{1}{15 \text{ cm}} \\
 \frac{1}{p} &= \frac{3 \text{ cm} - 2 \text{ cm}}{30 \text{ cm}^2} \\
 \frac{1}{p} &= \frac{1}{30 \text{ cm}} \\
 p &= 30 \text{ cm}
 \end{aligned}$$

Thus, the object distance is 30 cm, on the left side from the concave lens.

Magnification of the lens is

$$m = \frac{q}{p} = \frac{10 \text{ cm}}{30 \text{ cm}} = \frac{1}{3}$$

(Ignore negative sign)

The image is reduced to one-third in size than the object.

Q.6.(a) Explain Coulomb's Law. (4)

Ans For Answer see Paper 2015 (Group-I), Q.7.(a).

(b) A current of 3 mA is flowing through a wire for '1' minute. What is the charge flowing through the wire? (5)

Ans Given data:

$$\text{Current } I = 3 \text{ mA} = 3.0 \times 10^{-3} \text{ A}$$

$$\text{Time } t = 1 \text{ min.} = 60 \text{ sec.}$$

$$Q = ?$$

Formula:

$$I = \frac{Q}{t}$$

$$Q = I t$$

Putting values, we get

$$Q = 3.0 \times 10^{-3} \times 60$$

$$Q = 180 \times 10^{-3}$$

$$Q = 180 \text{ m C}$$

Q.7.(a) Differentiate between hardware and software. Also write name of different hardware and softwares.

Ans 1. **Hardware:**

The term hardware refers to machinery. This includes the central processing unit (CPU), and all of its support equipment. Among the support equipments are input and output devices, storage devices and communication devices.

Name of different hardware are CPU, Monitor, keyboard, Mouse, etc.

2. Software:

The term software refers to computer programs and the manuals that support them. Computer programs are machine-readable instructions that direct the circuitry within the hardware parts of the CBIS to produce useful information from data. Programs are generally stored on some input / output medium, often a disk or tape.

Name of different softwares are Microsoft Edge, Adobe Flash Players, Skype, Google Chrome, etc.

(b) Cobalt-60 is a radioactive element with half-life of 5.25 years. What fraction of the original sample will be left after 26 years?

Ans For Answer see Paper 2017 (Group-I), Q.7.(b).